DOCUMENT RESUME

ED 256 764 SP 026 129

TITLE Beating the Odds. An Educational Program Relating Safety Belt Use to Health Lifestyles for High School Students.

INSTITUTION American Alliance for Health, Physical Education, and Recreation, Washington, D.C. Association for the Advancement of Health Education.; Department of Transportation, Washington, D.C. National Highway Safety Bureau.

PUB DATE [83]
NOTE 28p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Accident Prevention; *Driver Education; High Schools; High School Students; *Safety Education; Safety Equipment; *Traffic Accidents; *Traffic Safety
IDENTIFIERS *Seat Belts

ABSTRACT

This program module is designed to encourage the use of safety measures in driving, emphasizing the use of seat belts. The learning activities focus upon: (1) the importance of the use of safety belts as the most effective preventive measure in a safe and healthy lifestyle; (2) the reasons people cite for not wearing safety belts and the accuracy of these reasons; (3) ways in which belts help in a crash, the importance of the lap and shoulder belt combination, and how belts help in different crash situations; (4) differences between safety restraining devices; (5) how the locking mechanism of a safety belt works; and (6) the responsibilities of drivers for passengers. Question sheets accompany each unit. Included in the packet is a technical manual on the use and effectiveness of safety belts. (JD)

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# BEATING THE ODDS



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An Educational Program Relating Safety Belt Use To Health Lifestyles For High School Students

"BEATING THE ODDS," an educational program relating safety belt use to health lifestyles for high school students.

## Program Overview

To develop lifestyles that foster good health, students need a foundation of accurate information about major health issues. Traditionally, these young people have learned about topics such as nutrition, exercise, smoking, alcohol, and drugs. But they may not have been taught about the deadliest and most immediate threat to their health — the automobile crash. Car crashes kill more teenagers than any disease or other incident, and the odds are that many of your students will be involved in an injury-producing crash.

Drivers and passengers cannot predict when crashes will occur, but they can protect themselves by always using the safety belts already available in the car. This program, "Beating the Odds," provides facts, raises issues, and promotes an important behavior needed to protect the health and safety of all vehicle occupants.

While the program may be used alone, supplementing it with audiovisual materials is recommended. These can be ordered from the sources listed in the Occupant Protection Reference Manual as well as from the Association for the Advancement of Health Education (AAHE) before presenting the program. If you choose to use films, appropriate ones are listed for each unit, with the most **highly recommended** ones printed in **boldface** type. While teaching suggestions for using the films are included in this guide, remember you can use the program effectively without them.

The program is divided into six units:

Unit 1: What Are My Risks?
Unit 2: What's True? What's Not?
Unit 3: How Do Safety Belts Help in a Crash? How Effective Are They?
Unit 4: What About Automatic Protection Devices?
Unit 5: How Do Safety Belt Retractors Work?
Unit 6: Who's in Charge Here?

Activities for each unit are presented on the Learning Activity Sheets, provided on plain paper for photocopying and on masters for use on a spirit duplicating machine. The answers on the spirit duplicating masters will not reproduce.

## Using the Program

Before you present "Beating the Odds," familiarize yourself with this teacher's guide, the six student learning activities, and the Occupant Protection Reference Manual. You may want to review the extra technical background information in the manual before each lesson. Be sure to preview the films if you are using them. Finally, you may want to post the Risk-Taker game board before class to promote interest in the unit.

## Requesting Films and Additional Information

The Association for Advancement of Health Education (AAHE) may have already provided you with an audiovisual kit, including these films: 1) "Dynamics of a Crash," 2) "Safety Belts Save Lives," 3) "Risk," 4) "Headache," and 5) "Child Restraints." The film "Are You Convinced?" is also available from A.A.H.E. If you would like to use the kit and/or the film "Are You Convinced?" send a self-addressed label with your request to the A.A.H.E., 1900 Association Drive, Reston, VA 22091. In addition, the film "Automatic Answer" can be borrowed from the National Highway Traffic Safety Administration by sending a self-addressed label to NHTSA, Attn: Film Loans, Office of Occupant Protection, NTS-10, 400 7th Street, N.W., Washington, D.C. 20590. You can consult the NHTSA document "A Guide to Audiovisual and Print Materials on Safety Belts and Child Car Safety Seats" or the Reference Manual included in this kit for further information about all of these supplements. For more information about safety belts and other materials, contact A.A.H.E. or your State Highway Safety Office.

This program is a public service of

Association for the Advancement of Health Education and US Department of Transportation, National Highway Traffic Safety Administration

Contributors to the development of this program were Dr. B.E. "Buzz" Pruitt of AAHE, and Dr. James Nichols and Marilena Amoni of NHTSA.

## Learning Activity One:

### What Are My Risks?

### Objective:

Students will identify the use of safety belts as the single most effective preventive measure in a safe and healthy lifestyle.

Ask students to name significant threats to their health and safety. They probably will name smoking and drug and alcohol abuse as major risks. They may not readily realize that the number one threat to young people is the automobile crash, and you may choose not to provide this information until students complete Learning Activity One. (CAUTION: Explain that the activity sheet is not a validated evaluation instrument and will not be graded, but rather a means for illustrating health behaviors and risks in their lives.)

After students have completed the activity (including scoring their answers), tabulate the number of scores in five-point intervals (0-4, 5-9, 10-14, etc.) and perhaps graph the results for the entire class so that students may compare their own scores with the overall distribution. You can also calculate the average score for comparison. Afterward, have students make a list of suggestions to help improve their healthstyles.

Discuss their choice of the most important longevity factor, asterisked on the questionnaire. Point out that automobile crashes are the leading cause of head and spinal cord injuries, and disfigurement, and that young people are more likely to die from automobile crash injuries than from any other single cause. The single most effective protection against automobile crash injuries is to use safety belts regularly and correctly.

It has been estimated that at least one out of every three students in your class will be involved in an injury-producing crash over his or her lifetime. How many students is that? How many of your students already know someone who has been in an injury-producing car crash?

Complete this lesson by having groups of two to six students play the "Risk-Taker" game. See the game board for instructions.

### Optional Activity:

Ask your students to use the questionnaire with other students, teachers, family members, or friends. Have the class tabulate the results and see if there are any differences between different groups.



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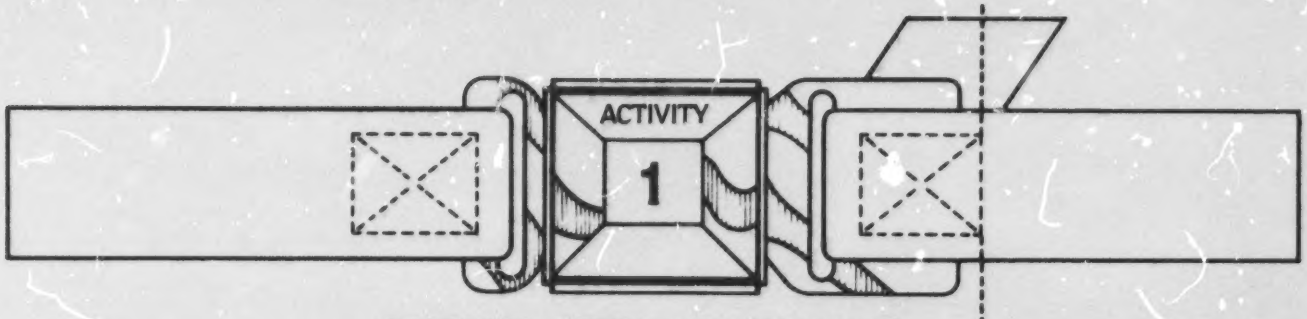


# WHAT ARE MY RISKS?

Even in today's health-conscious society, many people see "risk" as something imposed by outside forces, rather than as something the individual can control. While some types of risk are outside your immediate control, others can be controlled to a certain degree. These are health risks that you can do something about. Doctors say you should live longer than your parents or grandparents, but chances are you don't want just more years; you want more good, healthy years.

The following questions are not a test and will not be graded, but they can help you to determine in which risk areas you're doing a good job of protecting your health so that you can enjoy those years. The questions also can reveal in which areas you may need to be more careful.

First, fold the paper back along the dotted line. Then answer each question by circling "Yes" or "No." After you've answered each question, unfold the paper and add or subtract points according to the directions. If no addition or subtraction is indicated for an answer you have given, simply enter the previous score on that line. Your final score will provide an indication of your behavior.

Fold Along Dotted Line

| | Circle One | Cumulative Points |
|---|---|---|
| 1. Do you **exercise** at least three times a week? | Yes No | Add 7 for yes ____ |
| 2. Do you always **put on a safety belt** before riding in a car? | Yes No | Add 12 for yes ____ |
| 3. Does your family have a history of **high blood pressure?** | Yes No | Subtract 2 for yes____ |
| 4. Do you frequently drive **faster than the legal speed limit** when you drive? | Yes No | Subtract 5 for yes____ |
| 5. Have you ever **smoked regularly** in your life? | Yes No | Add 10 for no ____ |
| 6. Do you **salt your food** even before you taste it? | Yes No | Subtract 2 for yes____ |
| 7. Your appointment's on the third floor, and you can **walk or ride** the elevator. Do you take the stairs? | Yes No | Add 1 for yes ____ |
| 8. You ride to a party with a friend who promises to keep to a **one-drink-per-hour limit.** Your friend doesn't and becomes intoxicated. Would you either insist on driving home or ride with someone else? | Yes No | Add 10 for yes ____ |
| 9. Have you been trying to **cut down on your sugar** intake? | Yes No | Add 3 for yes ____ |
| 10. Do you usually get seven or more hours of **sleep** at night? | Yes No | Add 4 for yes ____ |
| 11. Do you have a really **good friend** you can talk to about your troubles? | Yes No | Add 5 for yes ____ |
| 12. You want a **quick snack.** You can have either potato chips or fruit. Would you choose the fruit? | Yes No | Add 3 for yes ____ |
| | | Total score ____ |

Now, read through the statements again and place an asterisk (*) next to the one factor which you believe most affects your chances for a long life.

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# WHAT'S TRUE? WHAT'S NOT?

Although safety belts have been required equipment in passenger cars for nearly twenty years, many people still avoid using them and have many excuses for their non-use. There is a great deal of factual information supporting the effectiveness of safety belts. Despite this, many people appear to be operating on misinformation. You don't have to look far to find evidence of this. Many of your friends can provide you with examples of misinformation concerning safety belts. How can you separate the fact from fiction?

First, list five reasons why you think people don't wear their safety belts:

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

After you're finished, check the reasons you think are based on factual information. Which do you think are more likely to be based on misinformation?

Consider the following ten statements about safety belt use. Mark "T" if you believe the statement is true or "F" if you believe it is false. Remember, here you are trying to identify facts.

1. F — If I'm involved in a serious car crash, my chances of injury will be less if I'm **thrown clear** of the car. Your chances of death or serious injury are 25 times greater when thrown out of a car in a crash.

2. F — Safety belts are a good idea for long trips and highway travel, but they aren't necessary for **short trips** at low speeds. Most crashes occur within 25 miles of home, at speeds under 40 mph.

3. T — Less than 20 percent of drivers **regularly wear** safety belts. Yet 75 percent appear to be open-minded about the issue.

4. F — I don't need to wear **both** a lap belt and a shoulder belt. A shoulder belt should never be worn without the lap belt; adding a shoulder belt to a lap belt doubles its effectiveness.

5. F — If I'm in a car that is on fire or submerged under water after a crash, safety belts are likely to **trap** me inside. Less than one in a hundred accidents involve fire or submersion. You are more likely to escape if you are conscious and unhurt.

6. T — **Young people** are more likely to die from injuries received in automobile crashes than from any other single cause. Car crashes are the greatest cause of death of young people.

7. F — Safety belts may be a good idea for poor drivers, but a **good driver** knows how to avoid trouble on the road. Even the best driver has no control over the actions of other drivers, especially drunk drivers.

8. F — Safety belts actually cause **more severe injuries** than they prevent. Injuries are almost always more severe when belts are not worn.

9. F — There's no reason for **back seat passengers** to wear safety belts. Back seat passengers need belts to avoid hitting other passengers and being thrown around the vehicle.

10. F — Safety belts that **won't lock up** when you pull on them are not likely to hold you back in a crash. Most safety belts are designed to lock up only when the car decelerates rapidly such as in a car crash.

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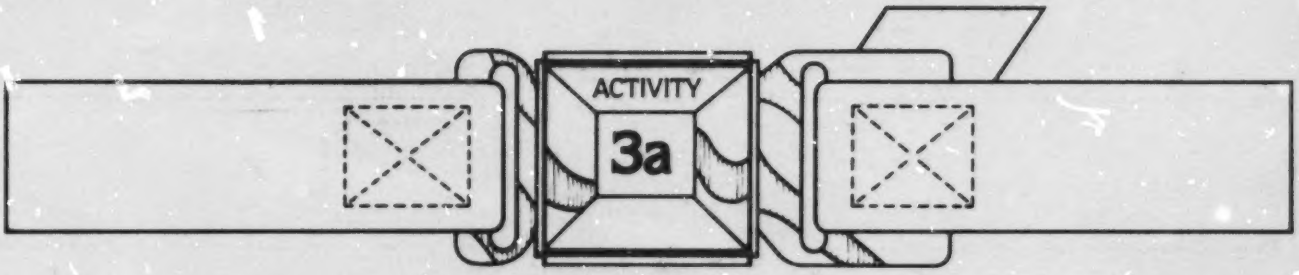
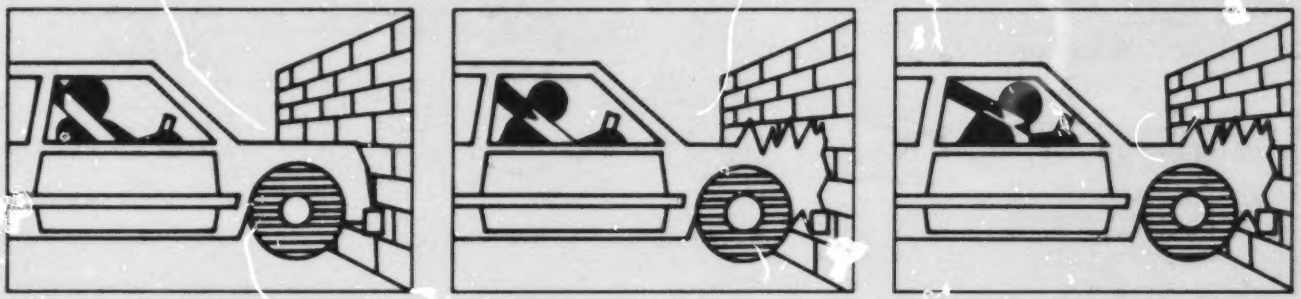



# HOW DO SAFETY BELTS HELP IN A CRASH? HOW EFFECTIVE ARE THEY?

### What Happens in a Crash with Safety Belts?



Car hits barrier. Car crushes. Car stops. Occupant stops without hitting interior as car stops.

### What Safety Belts Do

There are at least six specific ways safety belts protect you in a crash:

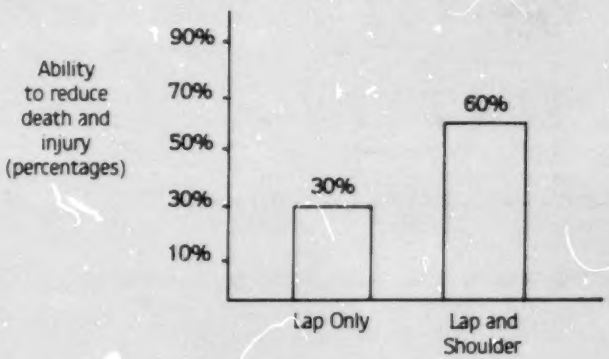
1. They prevent your **head and face** from striking the dashboard, steering wheel or windshield.
2. They allow taking advantage of **ride down** (the crushing distance of the car).
3. They stop you and your passenger from **hitting each other.**
4. They **spread the forces** of the impact across the stronger parts of your body.
5. They help the driver **control the vehicle** in multiple impacts or in evasive maneuvers.
6. They keep you and your passengers from being **thrown out** of the car.

### Lap vs. Lap and Shoulder Belts

Have you ever wondered why cars don't have just lap belts, as they used to? It probably would be less of a hassle. But there's a very good reason for having shoulder belts. Study Figure 1.

Figure 1

**Safety Belt Effectiveness in Reducing Death and Injury**




Source: NHTSA Towaway Study (1976) (figures rounded)

(go on to Activity 3b)

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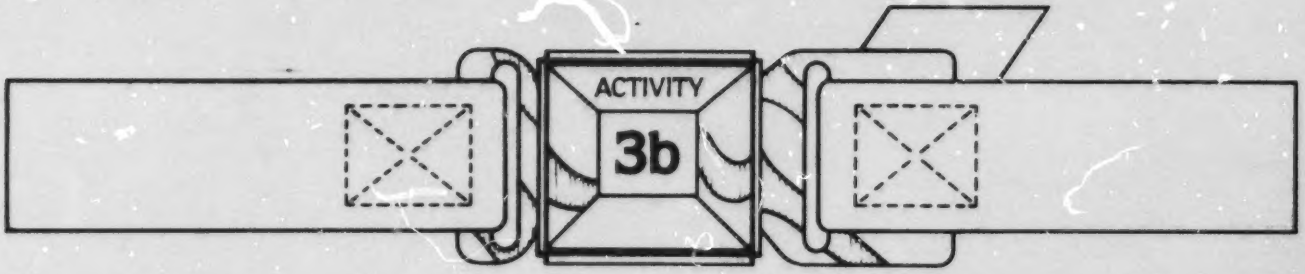



See Figure 1 (Activity 3a) to answer these questions.

1. How effective are lap and shoulder belts in this study?

   Ans.: 60%.

2. How many times more effective are lap and shoulder belts than lap belts alone?

   Ans.: 2 times.

Why is the shoulder belt such an important part of the system? Look again at the six things belts do. Now list three primary ways **shoulder** belts protect you in a crash:

1. Ans.: Take advantage of stopping distance of the car
2. Ans.: Prevent head and face from hitting dash or windshield
3. Ans.: Spread forces across stronger parts of the body

Which five primary ways do you think lap belts provide protection? (Some may overlap with shoulder belt actions.)

1. Ans.: Take advantage of "ride-down"
2. Ans.: Stop passengers from hitting each other
3. Ans.: Spread forces across stronger parts of the body
4. Ans.: Help driver control the vehicle
5. Ans.: Stop passengers from being thrown out of the vehicle

Which important function do shoulder belts serve that lap belts do not?

Ans.: Prevent head and face from hitting dash, steering wheel and windshield

## Side and Rear Impact Crashes

Frontal crashes are the most serious crashes. However, nearly half of all deaths and injuries result from other types of crashes such as side impact, rear impact, and rollover crashes.

Look at Figure 2. How effective are lap and shoulder belts in preventing injuries in the following types of crashes:

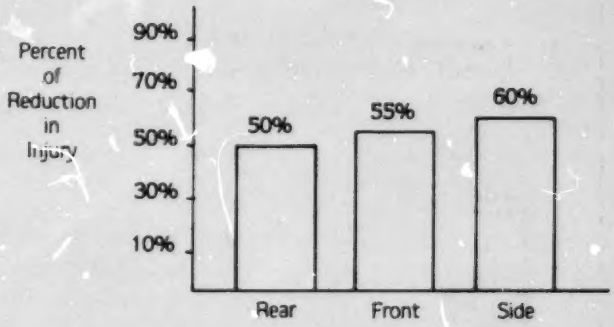
1. rear impact: 50 %
2. frontal impact: 55 %
3. side impact: 60 %

Which actions of the safety belt (primarily the lap belt) do you think are responsible for side impact effectiveness?

1. Ans.: Keep passengers from hitting each other
2. Ans.: Keep passengers from being thrown out

Figure 2

Safety Belt Effectiveness
(Lap & Shoulder Belts)




Source: 1976 NHTSA Towaway Study

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# WHAT ABOUT AUTOMATIC PROTECTION DEVICES?

## Manual Safety Belts

Most safety belts require the occupants to (1) reach for them, (2) pull the belts around them, and (3) buckle them up. These are called manual belts because they require the above actions by the occupant. Two types of automatic protection devices have been developed which require no such action by the occupant. They are (1) **automatic safety belts** and (2) **air bags.**

## Automatic Safety Belts

Automatic safety belts wrap around the occupant of a car when the door is closed. They require no reaching, pulling or buckling actions by the occupant.

The belts are connected to the door at points A & B. When the door is opened, these ends of the belt extend out with the door. This allows the occupant to slide into the seat and under the belt. When the door closes, the belt falls across the lap and chest of the occupant, and a "retractor" reel takes in the slack. In an emergency, the belt can be detached at point C.

1. How do belts **open up** to let you in the car?

   Ans. They are attached to the door. When the door opens, the belts "open" in that they allow the passenger to slide in under them.

2. What takes up the **excess slack** in the safety belt when the door closes?

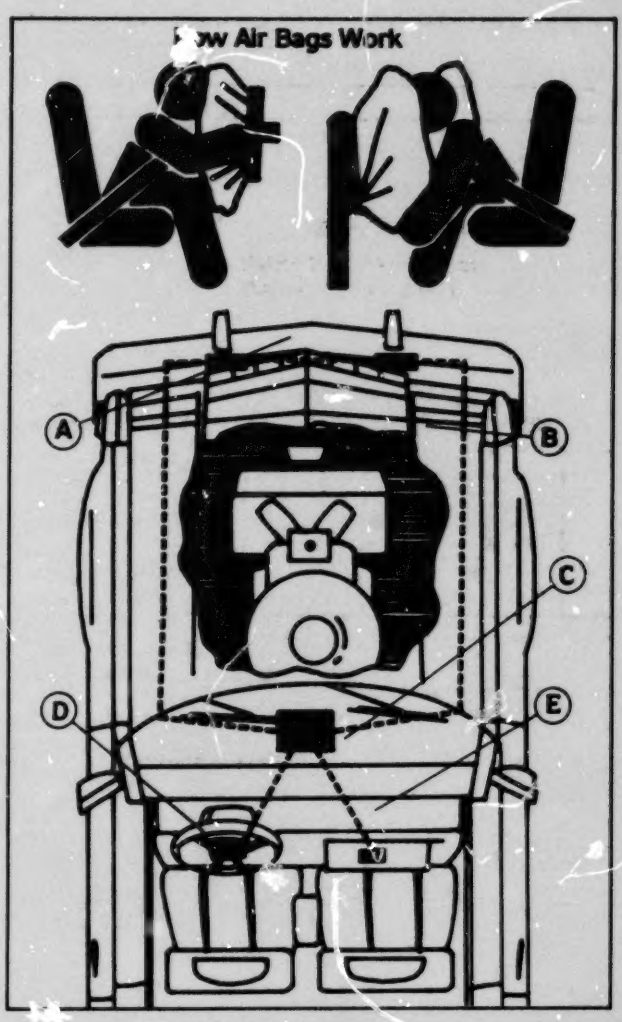
   Ans. The "retractor" reel (just like with a manual belt)

3. How would you **get out** in an emergency?

   Ans. Either open the door or detach the belt at point C.

## Air Bag System

With the system shown in the next figure, inflatable bags are hidden in the steering wheel (D) and the dash (E). When a 12 mph (or greater) frontal crash occurs, electronic sensors located at A and B* trigger a control unit C which causes a canister of sodium azide to explode instantaneously, as nitrogen gas. This gas inflates the air bags which are made of a porous material, located at D and E. The bags inflate to cushion the crash and then deflate immediately after impact to prevent rebounding. This system is sometimes called the air cushion or air bag restraint system.




(go on to Activity 4b)

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Frontal crashes account for more than half of all fatalities each year. Ninety percent of these fatalities are front seat occupants. The air bag provides the most effective protection for a frontal crash. Why do you think that is?

Ans.: It spreads the forces across the widest possible area of the body.

## Effectiveness of Manual and Automatic Protection Devices

From what you now know about traffic crashes, it should be clear that some kind of occupant protection is needed. The question is which kind of protection: manual safety belts? automatic safety belts? air bags? a combination?

Look at the table below:

Estimated Effectiveness of Various Restraint Systems in Reducing Fatalities

| Crash Type | Single Systems | | | Combined System |
|---|---|---|---|---|
| | Manual Safety Belts | Automatic Safety Belts | Air Bag | Air Bag Lap Belt |
| Front | .58 | .58 | .65 | .77 |
| Side | .58 | .40 | .16 | .50 |
| Rear | .30 | .30 | .10 | .15 |
| Overall | .58 | .50 | .40 | .66 |

*All figures are approximate. Estimates vary from study to study. Source: Report to Secretary of Transportation, 1976.

Now answer the following questions:

1. Which **type of crash** results in the most deaths?

   Ans.: Frontal

2. What percent of fatalities involve **front seat** occupants?

   Ans.: More than 90%

3. Which **single system** provides the greatest protection in a Frontal crash?

   Ans.: Air bag

   What percent?

   Ans.: 65%

4. Which **single** system provides the most overall protection against **all** crash types?

   Ans.: Manual safety belts

5. Which type of protection is the most effective **overall?**

   Ans.: Air bag and lap belt combination

6. On the back of this paper, list at least one major advantage and disadvantage for **each system.**

   Ans.: Answers in teacher's guide.

7. For **each system,** do you think the advantages outweigh the disadvantages?

   Ans.: Yes

   Explain: _____

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# HOW DO SAFETY BELT RETRACTORS WORK?

Does your safety belt work? Will it actually lock up and hold you back in a crash? Many people believe that because they can bend forward or pull on their safety belt without it locking up, the safety belt won't lock up and hold them back in a crash. Have you ever thought this?

When shoulder belts were first introduced, they allowed no forward movement of the occupant once they were fastened and adjusted snugly. People didn't like that because they felt constrained.

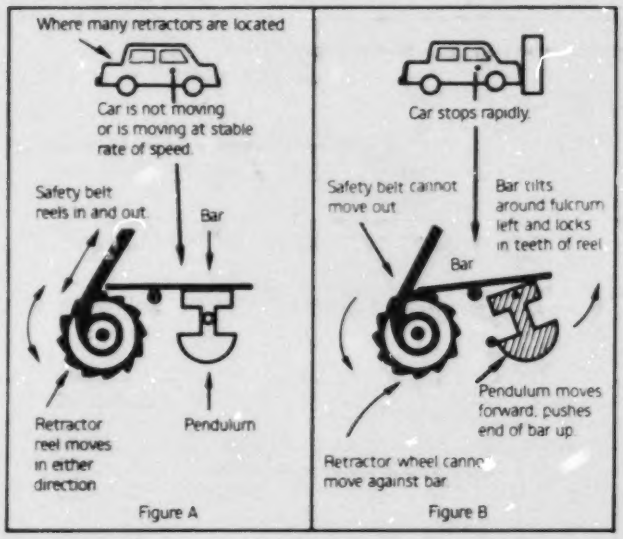
Engineers then put "**retractors**" on belts which allowed the shoulder belts to reel in. Whenever the person was not leaning forward the retractor would reel in excess slack. Early retractors included a mechanism which locked up if the **belt** moved rapidly (for example, if you pulled it out rapidly). These were called "belt-sensitive" retractors. Why?

Ans.: **They respond to movement of belt.**

People often didn't like these early retractor systems because they sometimes locked up when they shouldn't have. Now engineers have developed a new type of retractor which locks up only when **the car** accelerates or decelerates rapidly. These are called "car-sensitive" or "inertial" retractors. Why?

Ans.: **They respond to movement of car.**

Here's how they work:


Where many retractors are located
Car is not moving or is moving at stable rate of speed.
Safety belt reels in and out.
Bar
Retractor reel moves in either direction
Pendulum
Figure A
Car stops rapidly.
Safety belt cannot move out
Bar tilts around fulcrum left and locks in teeth of reel
Bar
Pendulum moves forward, pushes end of bar up.
Retractor wheel cannot move against bar.
Figure B

In Figure A (car under normal circumstances), the belt is free to be pulled in or out. In the second figure, the belt cannot be pulled out. Can you explain why? Try answering the next few questions.

1. What does the belt **reel up** on?

   Ans.: Retractor reel

2. In which figure is the retractor reel free to move in **either** direction?

   Ans.: A

3. What does this allow the safety **belt** to do?

   Ans.: To be pulled in or out

4. Why can't the **inertia wheel** move in both directions in the figure on the right (under emergency conditions)?

   Ans.: The bar locks it

5. Which way can the **belt** move in the second figure?

   Ans.: Only "in"

6. What does this do to the **passenger** who has the belt buckled around him or her?

   Ans.: Prevents forward movement

7. What causes the bar to **lock up** the inertia wheel?

   Ans.: Pendulum tilted

8. What do you think causes the **pendulum** to move?

   Ans.: Car changes speed suddenly (decelerates)

9. What would happen to the **bar or the pendulum** if you moved forward with the belt on or if you pulled on the belt very rapidly when the car was not moving?

   Ans.: Nothing

10. Would the **belt** lock up if the car stopped very quickly?

    Ans.: Yes

    How?

    Ans.: Pendulum tilts forward, bar tilts around fulcrum and locks into teeth of retractor reel. Belt can move only "in," not "out."

See if your parents can explain this. You just may know something they don't. Here's how you can show them:

Try a low speed (less than 5 mph) hard breaking stop in a dry, vacant parking lot **with everyone properly wearing a safety belt.** What happens to the safety belts?

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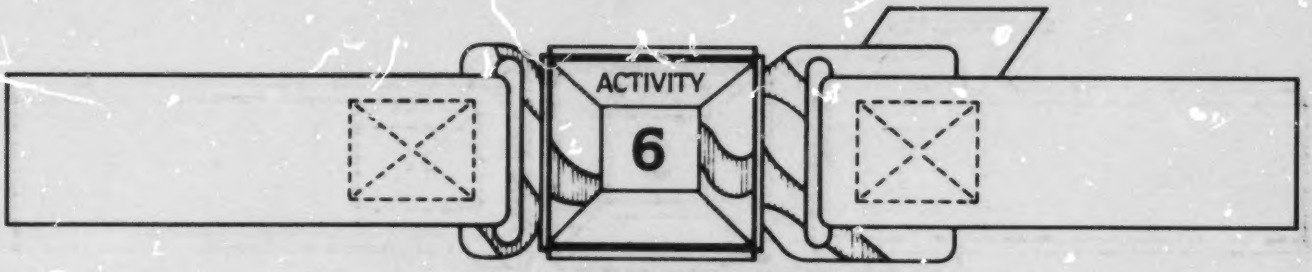


# WHO'S IN CHARGE HERE?

The following statements reflect driver attitudes in areas of responsibility. For each statement, indicate your own reaction by placing a check mark (✔) in the column that best describes your feelings.

| | Disagree Strongly | Disagree | Don't Know | Agree | Agree Strongly |
|---|---|---|---|---|---|
| 1. As the driver of a car, I have the authority to **insist that all passengers** wear safety belts. | | | | | |
| 2. If a passenger refuses to use safety belts at my request, I am justified in **refusing** to transport that passenger. | | | | | |
| 3. Passengers riding with me have the **right** to refuse to wear safety belts. | | | | | |
| 4. If my friend were seriously injured in my car by hitting the windshield, I would **not feel sorry** that I had not required him or her to buckle up. | | | | | |
| 5. People who know about the substantial risks of being injured in car crashes and about the effectiveness of safety belts have a responsibility to ask others to buckle up. | | | | | |
| 6. When I'm driving, I am **responsible** for the safety of young children, especially for their use of safety belts or child safety seats. | | | | | |
| 7. I would **not transport** a very young child unless he or she were in an approved safety seat. | | | | | |
| 8. If a mother riding with me insisted on holding her baby in her arms, I would **not feel at all responsible** if we were in a crash and the baby were seriously hurt. | | | | | |
| 9. If an unbelted passenger in my car were injured seriously in a crash that was not my fault, I **wouldn't feel at all responsible** for his or her injuries. | | | | | |
| 10. Drunk drivers pose a **significant threat** to me and my passengers. | | | | | |
| 11. When I am riding in a car, wearing my safety belt is the **most effective, immediate** action I can take to protect myself against the drunk driver. | | | | | |
| 12. As the driver, I would be **embarrassed** to ask my parents or friends to wear their safety belts. | | | | | |
| 13. I believe that wearing safety belts should be **required by law** just like child safety seats are. | | | | | |

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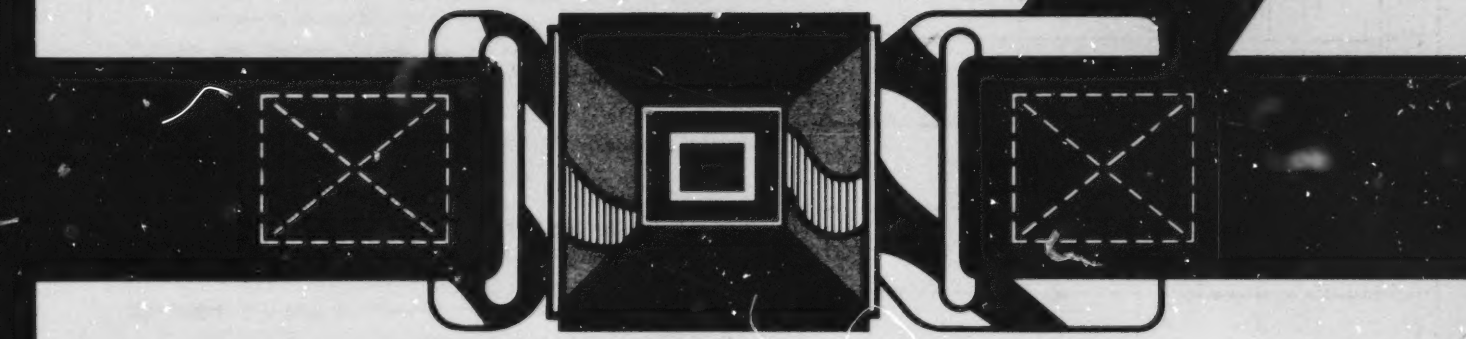
# Occupant Protection Reference Manual



U.S. Department of Transportation
National Highway Traffic Safety Administration

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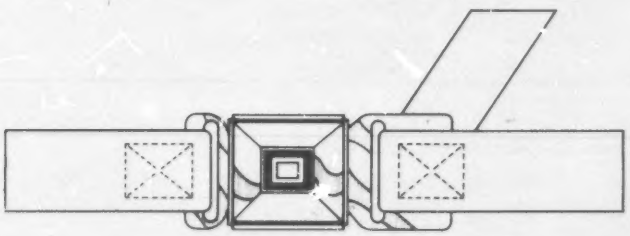


## I. WHAT ARE THE RISKS?

What are the odds that most young people will live a long and healthy life? What is the most, immediate threat to their health? And what can they do to increase their chances for a long and healthy life?

Injuries from motor vehicle crashes are the leading cause of death for people 1 to 35 years old. Traffic crashes result in more than 30,000 deaths and more than 400,000 moderate-to-serious injuries each year.

OVERALL DEATHS AND SERIOUS INJURIES
FOR OCCUPANTS OF CARS AND LIGHT TRUCKS
(Figures rounded for clarity. Actual figures slightly higher)

| | Fatalities | Injuries |
|---|---|---|
| Passenger Cars | 25,000 | 350,000 |
| Light Trucks | 5,000 | 50,000 |
| Total | 30,000 | 400,000 |

Figure 1

**Who's Getting Hurt in Car Crashes?**

Nearly half of the people killed in traffic crashes are under 25 years of age. For children between the ages of 5 and 15, motor vehicle fatalities account for approximately 50 percent of all accidental deaths. Males constitute the highest risk group of all. Young males (between the ages of 15 and 24) are almost three times as likely to die from a car crash as from any other cause.

**The Results of Lifestyle Choices**

Overall, young people are significantly over-involved in fatal motor vehicle crashes. Many of these casualties result from unnecessary risks, frequently taken by young individuals. The most important of these risks include driving while intoxicated, speeding, and not using safety belts. These risk factors aggravate the already dangerous situation which results from a lack of driving experience. Most teenagers don't realize that most of the trauma caused by traffic crashes is preventable. Safety belts can make a difference — but only if they are worn. Safety belts can reduce the number of severe injuries and fatalities by 50 to 60 percent. In other words, wearing a safety belt cuts in half your chance of being killed or seriously hurt if you are involved in a severe crash.

## II. WHAT HAPPENS IN A CRASH?

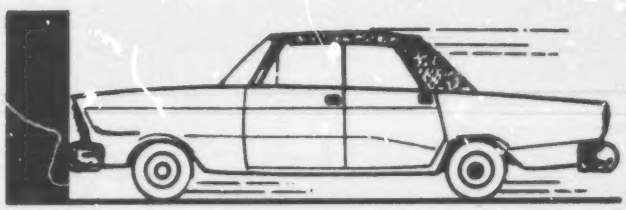
- More than half of all traffic deaths and serious injuries occur in frontal crashes.
- More than 90 percent of the victims are front seat passengers.
- Half of the crashes occur at speeds of 35 mph or less.

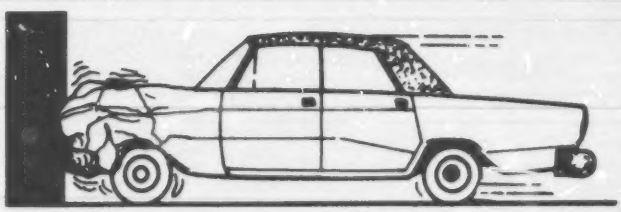
This doesn't seem possible because we think of 35 mph speeds as being slow. In fact, however, a 35 mph crash into an immovable object (with no braking and no deflection) is a very severe crash. It will severely injure **unrestrained** front seat occupants most of the time.

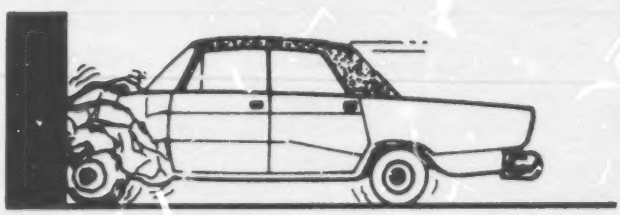
In a crash, there are really two collisions: (1) the collision of the car into another object and (2) the collision of the occupants with the inside of the car. It's the second collision, that of the occupants with the inside of the car, which kills and/or injures the occupants. In a 35 mph crash into a barrier (such as the one shown in the film "Dynamics of a Crash"), the car hits the barrier and comes to a stop (i.e., it decelerates from 35 mph to 0 mph) in 1/10th of a second. In doing so, the front end crushes about 2 feet and absorbs much of the energy released by the crash.

**What Happens in a Collision**

**1st Collision, The Car Collision**







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# 2nd Collision, The Human Collision

**0.000 seconds — car hits barrier**

**0.100 seconds — car stops**

**0.120 seconds — person hits car interior**

| Two Kinds Of Collisions Occur | Force Of 2nd Collision |
|---|---|
| • 1ST Collision — Vehicle into another object | Force = Mass x Acceleration (Deceleration) |
| • 2ND Collision — Occupant into the vehicle | Force = Body Weight x G |

Figure 2

It is very important to note that the more distance that an object has to stop, the less severe is the crash. In a 35 mph barrier crash, for example, the car comes to a stop in about two feet. A deceleration measuring device mounted in the passenger compartment would register a deceleration of approximately 20 G's. (One G is equal to the force of gravity. For reference purposes, a panic braking situation or a roller coaster would deliver slightly less than one G of deceleration. Astronauts experience up to about 11 G's.)

A front seat occupant **secured to the car by a safety belt** would experience and survive a 20-G deceleration, (similar to the car's rate of deceleration), probably without serious injury. **Unrestrained** front seat occupants however, would keep going forward at 35 mph until a split second after the car stops. Then they would hit whatever is in front of them (e.g., the dash, windshield, or steering wheel) and would stop in about 1/100th of a second (much faster than the car) and in a distance of only a few inches. Because of the quickness of the stop, the unbelted occupant would experience a much more severe deceleration of about 60 G's or more. The result is nearly always serious injuries or even death.

To estimate the number of G's of deceleration experienced by a body in a crash, you need to know both the speed of the body (in mph) at the time of the impact and the distance it takes the body to stop (in feet) after impact. Insert those numbers into this formula:

$$\text{Deceleration} = \text{G's} = \frac{\text{mph}^2 \times .034}{\text{stopping distance (feet)}}$$

(The constant .034 translates mph into feet per second.)

For example,

1. Restrained occupant in 35 mph crash stopping in 2 feet:

$$\text{G force} = \frac{35 \times 35 \times .034}{2} = 20.8 \text{ G's}$$

2. Unrestrained occupant in 35 mph crash stopping in 8 inches (.67 foot):

$$\text{G force} = \frac{35 \times 35 \times .034}{.67} = 62.2 \text{ G's}$$

Increasing the stopping distance by inches can make the difference between life and death. This is the principle of a motorcycle crash helmet. In this case, the additional fraction of an inch that the cushioning material provides for the head to stop (in a crash against another object) can reduce deceleration (G's) dramatically, thus preventing serious injury.

Remember, the 35 mph crash into a barrier which was just described was very severe. It was as powerful (for the passengers involved) as two cars of equal weight, **each** traveling at 35 mph, hitting each other head-on.

G's are only a measure of **how quickly** a body stops. The **total force** (in pounds) experienced by the body in such a stop can be calculated by multiplying its **weight** times the **deceleration** (G's).

Force = body weight (in lbs.) x deceleration (in G's)

For example,

1. Restrained 150 lb. occupant in 20-G crash (taking advantage of the full stopping distance of the car):

   Force = 150 lbs. x 20 G's = 3000 lbs.

2. Unrestrained 150 lb. occupant in a 62-G crash (not taking advantage of the full stopping distance of the car):

   Force = 150 lbs. x 62 G's = 9300 lbs.

Thus, an unrestrained occupant experiences a force more than three times as great as a fully restrained occupant.

Some people think they would rather be "thrown clear" in a car crash. Unfortunately, most occupants who are ejected from cars are only **partially** ejected, usually through a window or a partially opened door. Then they are often either crushed between the car and another object, scraped along the ground or pavement, or thrown into another object (rarely a soft one). It's not a desirable experience. Some studies have indicated ejected occupants have increased their chances of death or serious injury by as much as 25 times. Studies also have indicated that **most** people who die after being ejected from a vehicle would have lived often not seriously hurt had they remained in the car.

If the passenger compartment remains intact, as it almost always does, and if passengers can be stopped from slamming into the car's interior or worse, from being thrown out of the car, injuries can be minimized. There's sufficient room to survive inside most vehicles.

For further information on this subject, refer to the following documents: (1) the "Human Collision" from the Ontario Ministry of Transport; (2) the "Effectiveness and Efficiency of Safety Belts and Child Safety Seats" from the National Highway Traffic Safety Administration (NHTSA); and (3) the "Safety Belt Fact Book" from NHTSA.

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## III. HOW DO SAFETY BELTS WORK AND HOW EFFECTIVE ARE THEY?

### How Do Safety Belts Work?

In an automobile crash, occupants need either to avoid colliding with the internal parts of the car or to minimize the force of such a collision. It is also important to avoid colliding with other passengers and to avoid being thrown out of the vehicle.

This is called occupant packaging, and it is similar to the principles involved in packaging eggs or other fragile objects. An egg carton protects the eggs from outside forces by absorbing most of the forces itself (just as the front and passenger compartment of a car do); it keeps the eggs from hitting each other (as a safety belt does) and as the safety belt, it spreads the force of an impact over a wide area of the egg's surface.

Safety belts help in at least six ways. They:

- Help the occupant "ride down" the crash by beginning to stop the occupant as the car is stopping. This gives the person more distance and time to stop.
- Minimize or prevent the occupant from colliding with the dash, steering wheel, windshield or other internal parts of the vehicle;
- Spread the forces of the impact across the stronger part of the body;
- Prevent occupants from hitting each other;
- Prevent occupants from being thrown out of the vehicle; and
- Help the driver to maintain control of a vehicle in a sudden swerve or after an initial impact.

HOW SAFETY BELTS WORK
IMPACT: CAR BEGINS TO DECELERATE (FRONT END CRUSHES)
CAR SLOWS: OCCUPANT SLOWS WITH CAR. BELTS KEEP HEAD AND CHEST FROM CAR'S INTERIOR.
CAR STOPS: BELTS STRETCH, DISTRIBUTE FORCE OVER TIME AND OVER OCCUPANT'S BODY.

Figure 3

Many drivers and passengers think their shoulder belts won't work in a crash because they can pull on the belt and it won't "lock up." Thus, they feel that the belt won't hold them back in a crash. Well, it will! Here's what has happened over the years relative to the engineering of safety belt systems.

The first shoulder belts allowed no forward movement once they were fastened. People didn't like this confinement, so the belts were improved. In the early 1970's, auto manufacturers put in "retractors" which both reeled in excess slack in the belt and allowed forward movements. They included a mechanism that locked up when the belt moved out rapidly (e.g., if you pulled on it). These were called "belt-sensitive" (or automatic) retractors.

These early retractors often locked up when people didn't want them to. So, a different type of retractor system was designed to give people more freedom of movement in the vehicle. Figure 4 shows a newer belt system which has a little pendulum and bar in the retractor which lock the belt whenever the car decelerates suddenly. These are called "car-sensitive" or inertial retractors. Many people mistake this comfort feature for a malfunctioning belt. In fact, more than 50 percent of the people recently interviewed in a survey about safety belt usage stated that they thought that their belts were defective in that they would not lock up in a crash.

### How Car-Sensitive (Inertial) Retractors Work

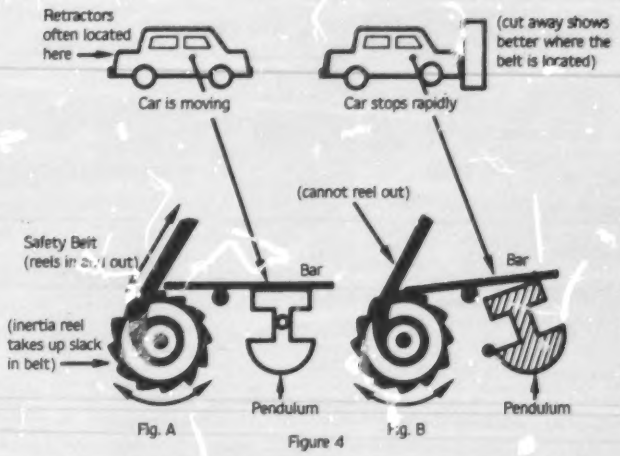



Figure 4

It is important for people to know that their belts will work in a crash! There's not much motivation to buckle up if they think the belt doesn't work. It is possible to test the automatic locking device by fastening the belt, driving slowly (5 mph or less) in a vacant parking lot, and braking sharply. In such a situation, one can feel the belt lock up and hold him/her back. However, this demonstration should be tried only when and where it is safe to brake suddenly.

### How Effective Are Safety Belts in Preventing Injury?

The combination of a lap and shoulder belt is much more effective than just a lap belt alone. As the film "Safety Belts Save Lives" indicates, shoulder belts are essential in keeping the head and upper body from slamming into the windshield or dash. In fact, lap and shoulder belts together are about twice as effective in preventing death and injury as are lap belts alone.

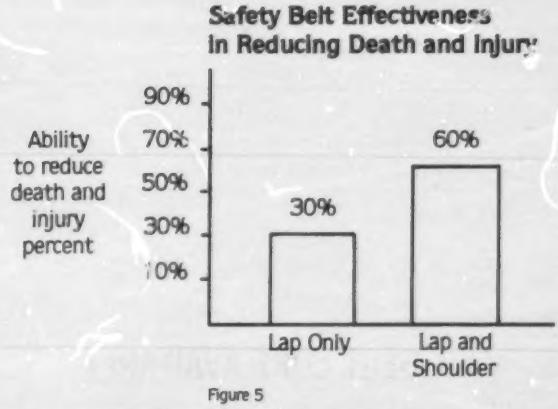
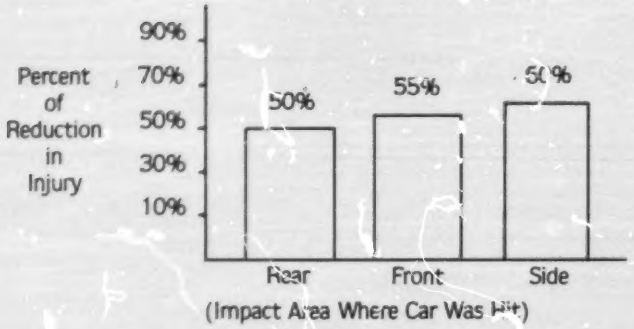



Figure 5

**Safety Belt Effectiveness by Impact Areas (Lap & Shoulder Belts)**




Source: 1979 NHTSA Towaway Study

Figure 6

Evidence for the effectiveness of safety belts has come from a number of studies: 1) studies of test crashes such as those shown in "Dynamics of a Crash" and "Safety Belts Save Lives"; 2) comparisons of injuries received by belted-versus-unbelted occupants in real-world crashes; and 3) by observing reductions in death and injury rates in foreign nations which have dramatically increased safety belt usage by passing laws. Such evidence is summarized in the NHTSA "Effectiveness and Efficiency of Safety Belts and Child Restraints" report (Nichols, 1982).

Perhaps the most convincing evidence comes from the scores of studies which have compared the injuries of belted versus unbelted passengers in real crashes. These studies have been conducted in a variety of nations and for many types of crash situations. The following results demonstrate typical findings and conclusions concerning the effectiveness of safety belts from such studies:

- Safety belts were found to be 78 percent effective in reducing serious injuries and fatalities in a 1974 Washington State study. (State of Washington, 1974)
- The overall life-saving effectiveness of lap and shoulder belt combinations, when worn, was found to be approximately 60 percent in a large multi-state study conducted in 1976. (NHTSA, 1976)
- Safety belts were found to greatly reduce both fatalities and serious injuries in several studies conducted in the State of Michigan. (Huelke, 1977 and 1981)
- Safety belt wearers were found to sustain fewer and less serious injuries than non-wearers in a 1978 study; the proportion of occupants totally escaping injury rose from 28 percent to 42 percent. (Hobbs, 1978)

Some important conclusions which can be made from studies of safety belt effectiveness are:

1. Safety belts are just as effective in reducing injuries in side impact and rollover crashes as in frontal crashes.
2. While some estimates of safety belt effectiveness have been as high as 80 to 90 percent, most experts feel that the effectiveness of lap and shoulder belts in preventing death and injury in real-world crashes ranges from 50 to 60 percent. (This means that, on the average, restrained occupants receive 50 to 60 percent fewer severe and fatal injuries than do unrestrained occupants.)

**How Effective Are Safety Belts?**

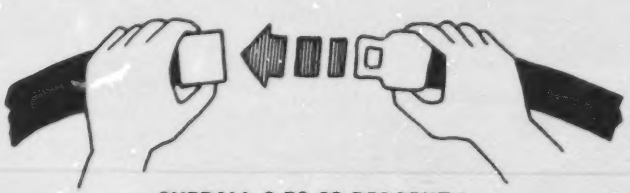



Figure 7

3. Not all crashes are survivable. In some crashes, the forces are so great that injuries can be caused by the belt as well as by other objects. Improperly wearing the lap belt high on the stomach can also cause injuries. However, studies which have investigated belt-related injuries have concluded that, in nearly all cases, the injuries would have been much worse had the belts not been worn.

**Small vs. Large Cars**

Safety belts are very important in crashes involving small cars. As the figure shows, the probability of being injured in a small car is much greater than in a larger car. But, as the figure also shows, safety belts can be very effective in reducing this increased risk. Shoulder belts are especially important in small cars.

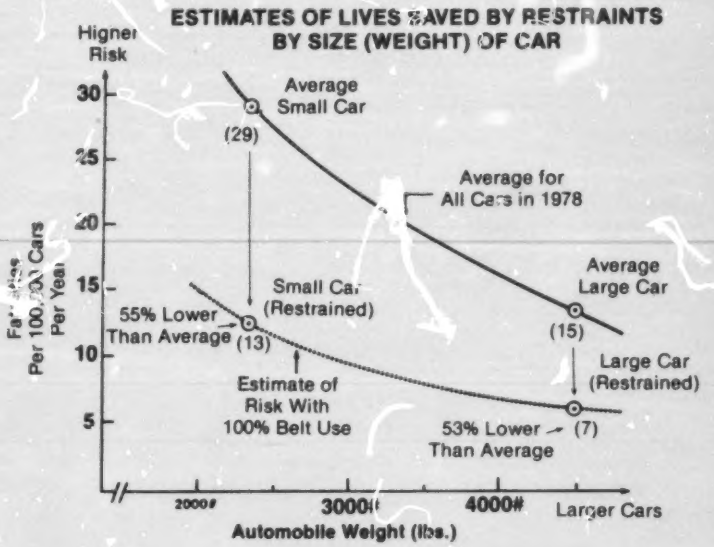



Figure 8

**Rollover Crashes**

Safety belts are perhaps most effective in rollover crashes. Usually a rollover is a series of several minor impacts. The most serious threat in such a crash is not the magnitude of force of any single impact (which is usually relatively small). Rather it is the risk of being thrown around inside the car or worse being thrown out of the car. Broken necks and injured spinal cords frequently result from occupants being tossed around inside the car in a rollover, and ejected occupants are often rolled over by the car. Belted passengers usually escape these injuries entirely. One recent Michigan study (Heulke, 1981) has suggested that safety belts may be nearly 100 percent effective in preventing head and neck injuries in rollovers.

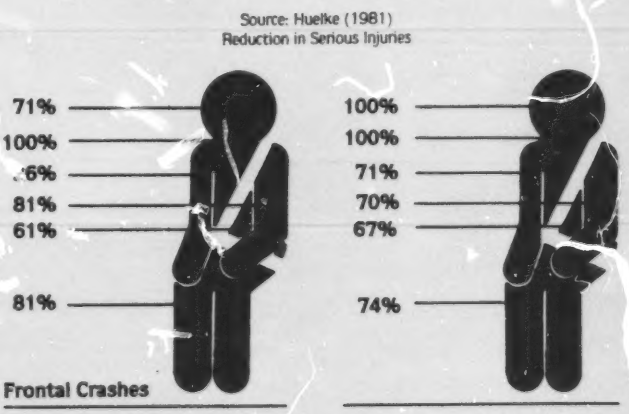



Figure 9

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## IV. AUTOMATIC CRASH PROTECTION

There are several common forms of automatic crash protection. Some of them include: (1) the crushing characteristics of the front end of the vehicle; (2) the impenetrability of the passenger compartment; (3) the collapsible steering wheel and/or padded dash; and (4) the use of the back seat, which is much safer than the front seat especially for young children. However, two newer forms of automatic protection are important. They are: (1) automatic safety belts and (2) air cushions or air bags.

### Automatic Safety Belts

Automatic safety belts are similar to regular (manual) safety belts except that automatic belts do not require any effort by the occupant to put them on. Volkswagen, for example, has equipped some models of the Rabbit with automatic safety belts for the two front seats. As the door is closed, a shoulder belt, which is attached to the door and to the "in-board" side of the seat, is automatically pulled across the passenger. A "retractor" takes up slack in the belt as the door closes. A padded knee "bumper" takes the place of a lap belt and prevents the passenger from "submarining" under the shoulder belt in a crash. Chevrolet has offered a slightly different lap and shoulder version in some Chevette models. More recently, other manufacturers are offering such systems as optional equipment.

Figure 10

The effectiveness of automatic safety belts is about the same as that of manual safety belts. The problem with all safety belts is that they have to be used to be effective at all. Most often manual belts are not. While some owners disconnect them, surveys have shown that automatic safety belts are used much more frequently than are manual belts.

### Air Cushions

Air cushions or air bags provide another type of automatic protection device.

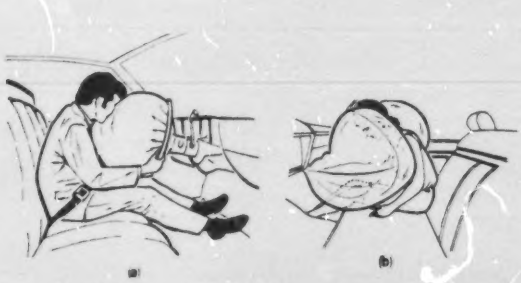


Figure 11

The air cushion system has sensors which are built into the vehicle, usually behind the bumper. In a frontal impact of 12 mph or greater, these sensors activate a compressed gas canister which inflates an air bag concealed in the steering wheel or in the dash (or both). The occupant impacts with the air bag instead of with the steering wheel, dash, or windshield. Immediately after the initial impact, the air bag begins to deflate to prevent rebounding.

**RESTRAINT SYSTEMS**
**(Estimated Fatality Reduction Effectiveness)**

| | Safety Belts | Passive Belts | Air Bag | Air Bag Lap Belt |
|---|---|---|---|---|
| Front | 58 | .58 | .65 | .77 |
| Side | .63 | .40 | .16 | .60 |
| Rear | .30 | .30 | .10 | .15 |
| Overall | .58 | .60 | .40 | .66 |

Figure 12

Source: Report to Secretary of Transportation, 1976.

The air bag is the most effective form of protection available for a frontal crash. It allows the occupant to decelerate more slowly and spreads the forces over the widest possible area of the body.

In side impact and rollover crashes, however, the effectiveness of air bags is much less than that of either the manual or automatic safety belt. This can be remedied, of course, by wearing just a lap belt. An air bag with a lap belt (or a lap and shoulder belt) provides the best overall crash protection available.

### Some Commonly Asked Questions About Air Bags

Q. Will a panic stop cause air bags to inflate?

A. No. The vehicle must decelerate by at least 12 mph to activate the air bags.

Q. Will the air bags inflate in a stationary car if it is hit by another vehicle?

A. Only if the car has its ignition on and is hit by a force equal to hitting a wall at 12 mph. Once the ignition has been off for about ten seconds, the system is deactivated.

Q. Isn't there a danger that the air bags might go off without reason and cause the driver to lose control?

A. An accidental inflation of air bags would be a very rare event. Also, in tests of unexpected deployment of the bags, drivers had no difficulty in controlling the vehicle, due to both the small size of the driver's air bag and its rapid deflation.

Q. Is the gas used to inflate air bags harmful or poisonous?

A. No. In most systems, the gas itself is nitrogen, which comprises 78 percent of the air we normally breathe.

Q. Should safety belts be used when a vehicle has air bags?

A. Yes. For maximum protection, safety belts should be used at all times because air bags are not as effective as safety belts in side or rear crashes.

Q. What happens if the air bag fails to inflate in a crash?

A. What happens when you don't wear your safety belt? Actually, in more than 250 serious frontal crashes in air bag equipped cars, the air bags operated properly. Also, wearing a safety belt as recommended will provide backup protection.

Q. How much do front seat air bag systems cost?

A. The current cost per car is estimated to range from $350 to $1000; mass production should result in much lower than initial costs. Also, a new type of sensor device promises to lower the costs dramatically.

Q. If an air bag has been used in a crash, must it be replaced, or can it be reused?

A. It must be replaced. Safety belts, too, should be replaced after use in a serious crash.

Q. Will air bags work when a car is several years old?

A. Yes. All parts of air bag systems are sealed from the environment and are expected to have an effective life exceeding that of the vehicle.

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## V. REASONS WHY PEOPLE DON'T BUCKLE UP

The single greatest reason why manual safety belts are not the most effective crash protection device is that safety belts are most often not used. Less than 20 percent of vehicle occupants use the safety belts which are already available to them in their vehicles. Why?

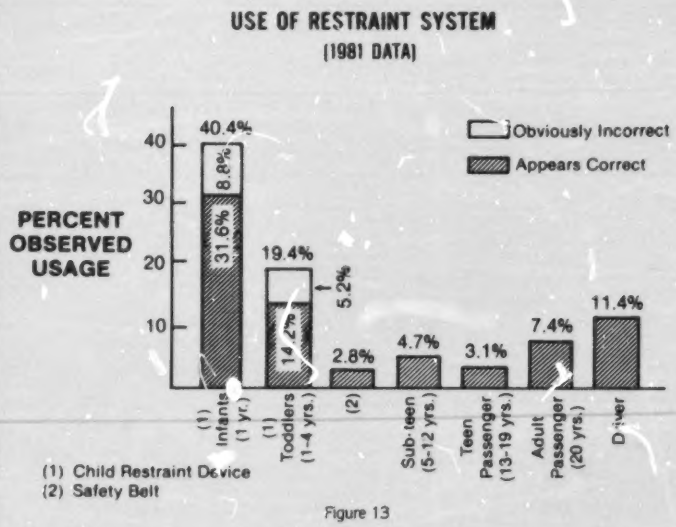


Figure 13

While there is plenty of evidence indicating that people should wear safety belts, people have many excuses for not wearing them. Here are some of the more common reasons given and some appropriate responses to them:

**"Belts are uncomfortable and inconvenient."**

Discomfort and inconvenience are usually poor excuses. Many regular safety belt users feel uncomfortable without the belt fastened.

Figure 14

While there's always a need for improvement, most belt systems today are acceptably comfortable after one becomes accustomed to them. In fact, many **regular users** are uncomfortable **without** a safety belt. In any case, the serious discomfort and inconvenience of a severe injury provides little comparsion to the minor discomforts of wearing a belt. And with continued public use and demand, we can expect that future safety belt systems will be much more comfortable and convenient.

**"The belts in my car don't work."**

Modern shoulder belts let you move comfortably, but still lock up in a sudden stop.

Figure 15

We've talked about this one already. Many people mistake the freedom to move forward with their **shoulder** belt on for a broken mechanism. Newer shoulder belts are designed to lock up only when the car changes speed or direction suddenly, not when the occupant moves forward (the **lap** belt always remains snug). This design combines the best of two options: (1) the ability to move forward with the belt fastened, and (2) the instant protection of the safety belt should a crash occur. For more information, see the section on belt effectiveness or consult the NHTSA brochure "Safety Belts: A History Lesson for Adults."

**"The probability that I'm going to crash is very small."**

One out of three people will be seriously injured in a car crash sometime during their lives.

Figure 16

Fortunately, the probability of being in a crash is very low each time you get into a vehicle. Over a lifetime, however, most people will get into a car about 45,000 times. The probability of being injured in a crash during one of those times is greater than 30 percent (Canadian officials estimate it as high as 50 percent). That's a substantial risk — and no one can pick which time it's going to happen. The only thing one can do in addition to driving carefully is to buckle up every time he or she gets into a vehicle.

**"I don't want to be trapped in a fire or under water."**

The best chance of survival — in fire or water — rests in remaining conscious, uninjured, and in full possession of your faculties, having protected yourself from that second collision. The greatest danger is the impact that precedes the fire or submersion.

Figure 17

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The odds are that most people won't be. Most deaths and injuries result from the "second collision" of the person with the inside of his or her car. Very few injury-producing crashes involve fire, and even fewer involve submersion under water.

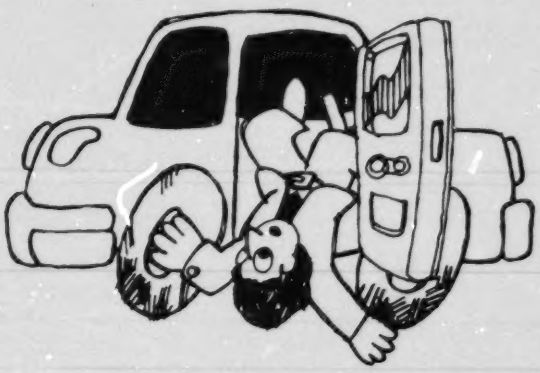
Even if a fire does occur, the greatest danger to the occupant is from the impact of his/her body with the inside of his/her car. Nearly all deaths to vehicle occupants result from injuries during this "human collision." Furthermore there is often no one around to rescue an occupant of a burning or submerged car. Thus, it is important to be able to rescue oneself. How can a person do that if he or she is knocked unconscious or severely injured, both of which are twice as likely to happen when they are unbelted?

Finally, the safety belt is not likely to trap anyone. Safety belts are easy to unlatch, by the occupants themselves or by potential rescuers. Many state patrol officers, who have pulled scores of dead and severely injured people from crashed vehicles, say that they have never yet had to unbuckle a dead person.

**"I'd rather be thrown clear in a crash."**

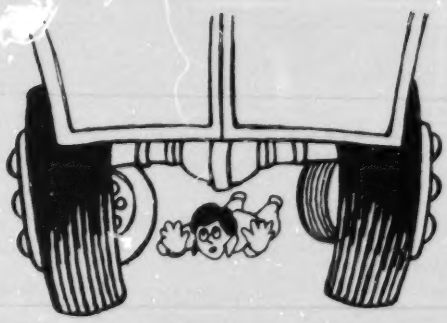
"Thrown clear" usually means being thrown through the windshield.

Figure 18



...being scraped along the pavement...

Figure 19



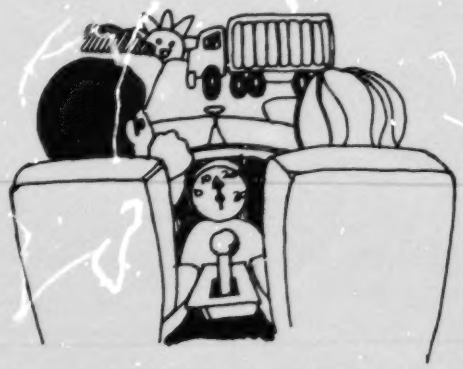
...or being crushed by your vehicle or another.

Figure 20

The idea of being thrown from a car and gently landing in a pasture beside the road is pure fantasy. "Ejection" almost always means "partial ejection" through the windshield, a window, or out of a partially opened door. It also usually results in the passenger being (1) crushed between vehicle and another object, (2) scraped along the ground, or (3) being thrown into another object. As we have said, being thrown out increases your chances of serious injury or death many times! Most people who die after being ejected would have lived had they remained inside the car.

By the way, motorcylists are almost always "thrown clear" in that they have no passenger compartment in which to remain. That is why motorcyclists are about 10 times more likely to die in a crash than are occupants who have the protection of a passenger compartment.

**"I'm not going far, and I won't be going fast."**



Most crashes occur under 40 mph and within 25 miles of home.

Figure 21

Where do you think most crashes occur: on long trips? at high speeds? Sorry, most crash deaths occur within 25 miles of home and at speeds of 35-40 mph or less. Everyday driving — to the store, to school, to a friend's house — poses the greatest danger. And even if you're driving slowly, the drunk driver coming around the next curve may not be. Remember, people can't pick the time or place when their injury crash will occur, and they won't have time to buckle up, even if they see it coming.

**"I'm a good driver; it won't happen to me."**

You may be a good driver, but you can't always control the other guy.

Figure 22

How many people are willing to bet their lives on this? Too many! Serious injuries due to traffic crashes happen to more than one out of every three people over a lifetime of riding in motor vehicles. Some drivers may be able to control themselves, but they can't control the other guy, especially the drunk driver. And, they won't always be the driver. How many times have you been in a close call with someone else driving? Did you have your belt on? If people make it a habit to wear a safety belt when they're driving, they're much more likely to wear it while riding as passengers.

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**"Some people, like children or pregnant women, shouldn't wear safety belts."**

Young children need the special protection of approved child restraints. An adult has neither the time nor the strength to stop a child, even a baby, from flying through the car in a collision.

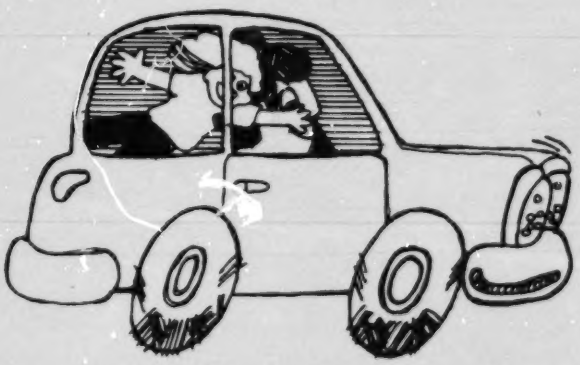
Figure 23

Young children should always use an approved child restraint. Most states now require the use of such seats by law. Older children should always use a lap belt, with a booster seat if necessary. According to the American Medical Association, both a pregnant woman and her fetus are safer with a safety belt, provided the lap belt is worn as low on the pelvis as possible. The shoulder belt provides extra protection. Just think what happens to an unborn baby when the mother smashes into the dash or steering wheel or is thrown out of a vehicle in a crash.

The AMA recommends that pregnant women wear safety belts to protect themselves and their children.

Figure 24

**"Rear seat passengers don't need belts."**



Rear seat passengers also need safety belts.

Figure 25

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It's true that the back seat is safer than the front seat. One reason is that the front seat helps cushion the impact. However, unbelted rear seat passengers are much more likely to be injured than if they are belted. Also, a front seat passenger will want those in the back seat to buckle up because in a frontal crash, unbelted back seat passengers will fly forward and hit passengers in the front seat, thus making their injuries more serious.

**"Belts can hurt you in a crash."**

Properly worn, safety belts won't hurt you most of the time. If they do, the injuries (usually bruising) are generally much milder than they would have been without safety belts.

Figure 26

As has been stated, sometimes a crash force is so great that nothing will prevent injuries. In such a case a safety belt is likely to contribute to some of the injuries. However, studies have consistently shown that the injuries in such crashes would most often have been much worse had the belt not been worn. It is rare when an injury caused by a belt is as serious as one caused by an unrestrained occupant slamming into the dash, steering wheel, or windshield.

Also, in most cases of injury caused by a safety belt, the injury is caused by the improper wearing of the belt. Lap belts must be worn low, across the pelvis, not riding up on the stomach where internal injuries can result. This is especially important to remember in the back seat where most cars have only lap belts and where, because of the lowness of the seat, the safety belt has a tendency to ride higher on the abdomen.

Another common misuse of belts is the tendency of female passengers to place the shoulder belt under their right arm (and across the lower chest area). This can result in serious abdominal injuries in a crash. The shoulder belt should come over the shoulder and across the upper chest. If the shoulder belt crosses the neck or face, as it might for a child, the shoulder belt can easily be placed behind the child's back. In such a situation, one loses the effectiveness of the shoulder belt but still retains the effectiveness of the lap belt. It's even better to move the child to the back seat.

**"I'll be able to brace myself or jump away from the point of impact."**

Collisions throw you toward the point of impact, unless a safety belt stops you.

Figure 27

As discussed on page 5, the forces of a crash are so great that no person, regardless of personal strength, would be able to brace against a crash force which can easily reach 9300 pounds in a 35 mph frontal crash.

It's equally impossible to "jump away" from the point of impact because in nearly all crashes people fly immediately and directly toward the point of impact (e.g., toward the other car or tree which is being impacted). In a side collision, the car is literally knocked out from under them, and they slam into the point of impact (i.e., the side being hit) with the same force as if they had not tried to "jump away" at all.

**"None of my friends wear safety belts."**

Just because your friends are willing to gamble with their lives is no reason for you to gamble also.

Figure 28

This may be true, but it doesn't make it right. Some people say they "forget," perhaps because they've never made buckling up a habit or because they have never had any reinforcement for this behavior from childhood throughout life. Others may admit that they're too lazy or that they don't want to wrinkle their clothes. These are often the same people who exercise regularly, watch their diets, and engage in other time-consuming activities to keep themselves healthy. They apparently do not realize that the **most important** activity they can engage in, to ensure a long, healthy life is to always wear their safety belts when riding in a car.

**What Can People Do To Help Their Family and Friends?**

They can do much! For example, they can explain the facts to those who don't know them or who haven't thought about them. About three-fourths of the public appear to be very open-mined about safety belt use; only about one-fourth seem adamantly opposed to it. People should not be disturbed if they can't convince "hard-core" non-users. They should focus instead on the majority of people who will respond to factual information. Again, they may not respond immediately but, given convincing information, they will respond over time. Remember, safety belts are the **most** effective means of ensuring the health and wellness of people who regularly ride in passenger vehicles.

Drivers have a special opportunity and responsibility to protect those who ride with them. One recent survey found that **more than 80 percent of passengers said they would buckle up if the driver would ask them to do so.** All one has to do is ask.

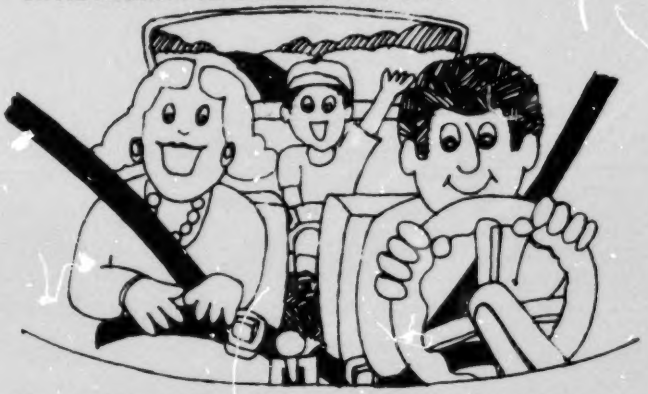
**What Is the Exception and What Is the Rule?**

There may be **some** merit for some of the above excuses, in **some** situations. But in response to, "What is most likely to happen?", the most realistic answers are:

1. A person is most likely to be injured in a relatively slow-speed crash close to home.
2. A person is most likely to be hurt by a collision with the steering wheel, dash, or windshield, not by fire or submersion.
3. Persons thrown out of the car are most likely to be seriously injured or killed.
4. Safety belts reduce the chances of injury in a crash by at least 50 percent.

How would a gambler play these risks?

## VI. AUTHORITY AND RESPONSIBILITY



You have the authority and the responsibility to have everyone buckle up every trip.

Figure 29

**Authority**

How much authority do drivers have over their passengers? They have much authority! As the previous section indicated, more than four out of five passengers say they would comply with a driver's request to buckle up. Thus, passengers appear to be willing to respect the driver's authority and to see the driver as the "captain of the ship," so to speak.

**Responsibility**

There's another side to this issue as well. Not only does a driver have authority, he or she also has responsibility for his or her passengers' safety. Knowledge of the following facts increases the driver's responsibility to ask his or her passengers to buckle up:

- Injury-producing crashes are very likely to occur at some time during one's driving/riding lifetime.
- The probability of injury and/or death can be reduced by 50 to 60 percent in a crash by wearing safety belts.
- Most passengers would buckle up if the driver would ask them.

**Responsibility of Drivers for Themselves**

Do drivers have a responsibility to buckle up themselves? Many contend that it is nobody's business but their own. That doesn't make sense. Every time someone is killed or seriously injured in a car crash, it affects everyone close to that person as well as the rest of society to some extent. Consider the emotional costs suffered by people close to the victim — parent, children, other relatives, close friends. In addition, all members of society bear the costs of traffic deaths and injuries through increased life, health, and automobile insurance premiums greater social security costs, and increased taxes for welfare, rehabilitation, hospitals, and ambulance services. Usually, the same people who contend that is only their business are the first to lament "Why didn't someone make me listen?" when a serious injury happens to them.

**Responsibility of Drivers for Passengers and of Passengers for Themselves**

What about the driver's responsibility for others? Does a young man driving his girlfriend to a movie have any responsibility at all to require that she wear her safety belt? Does knowing the effectiveness of safety belts and the risks of being involved in a crash — especially during night time (drinking) driving hours — increase his responsibility? Does the young woman have any responsibility to herself, her parents, or her boyfriend to insist on buckling up? How will they feel after the drunk or careless driver rounds the curve, crashes into them at a high rate of speed, and injures both of them seriously? How can the scars from those young faces be removed? How much suffering could have been avoided? Knowing the facts gives young drivers a choice. It also increases their responsibility for the safety of themselves and their passengers.

**Responsibility for Young Children**

Do drivers have an additional responsibility to require young children, usually age five and under, to be restrained properly in a child safety seat? Before safety restraint laws were introduced, more than 1,000 children aged 0-5 years were killed each year in automobile crashes. More than 30 times that many were seriously injured. Knowing that child safety seats are even more effective for young children than safety

belts are for adults, nearly all states have now passed laws requiring the use of such devices. Deaths and injuries for young children are now beginning to drop as usage rates increase.

Unfortunately, many adults are still choosing not to comply with these laws. In addition, a large number of those who are using child safety seats are using them incorrectly such as not connecting them properly with the seat belt. Just how much of a chance do young children have to protect themselves in a serious crash? All drivers parents or not have a responsibility for the protection of young children riding with them.

## VII. TYPES OF CHILD SAFETY SEATS

Child safety seats come in several shapes and sizes, because different stages of a small child's development require different types of protection. There is no "best" seat. Parents must look for features that best suit them, their child and their car. Here are some considerations.

**Infant-Only Safety Seats (from birth to about 12 months old)**

INFANT CARRIER

Starting with the first ride home from the hospital, babies need the special protection that only infant safety seats can provide. One should never let a baby ride in someone's arms. The force of a crash or even a sudden stop can tear the baby from even the strongest arms. If the adult is not using a safety belt, his/her body would be thrown forward, crushing the baby.

Infant safety seats, sometimes called infant carriers, are specifically designed to withstand enormous crash forces. Plastic feeder seats or car beds intended only for household use should never be used. Babies should ride in approved infant seats from birth until they weigh between 17 and 20 pounds and reach about 26 inches in length.

**Toddler Seat (1-4 year olds)**

TODDLER SEAT (WITH HARNESS)

Infant safety seats **always** face the rear of the car and are anchored by the vehicle's safety belt. The baby, held firmly by the safety seat's internal safety harness, faces backwards in a semi-reclining position. In a crash, the baby's back, rather than its delicate chest and abdomen, absorbs the crash forces. For newborns, a small, rolled-up blanket or towel placed around the head and shoulders provides additional support.

The rear seat is safer than the front seat. However, when driving alone with an infant, a driver may want to buckle the car seat in front. The baby will be happier and the driver won't be distracted from driving.

**Shield Style Seat**

TODDLER SHIELD

Children who weigh more than 17 to 20 pounds and can sit up by themselves need a forward-facing convertible or toddler safety seat.

Toddler seats come in two styles. The five-point harness style is anchored by the vehicle's lap belt, and holds the child with two shoulder straps, two pelvic straps, and a crotch strap all coming together at a buckle. The crotch strap should be kept as short as possible to keep the lap belt from riding up on the child's delicate abdomen. Some models substitute a movable shield for part or all of the harness.

The shield style seat is a C-shaped shell with energy-absorbing padding on the upper part of the shield. Once the shield is fastened by the vehicle's lap belt, the child can climb in unassisted. However, this design also makes it easier for the child to climb out, so it may require more attention to make sure the child remains in the restraint while traveling.

**Convertible Seats**

Some safety seats can be converted from an infant seat into a child seat which a toddler can continue to use until he or she is old enough to use a booster seat or wear safety belts. A convertible seat may save money since only one seat has to be purchased. However, such seats are heavier and cannot be carried into restaurants and stores easily.

**Auto Booster Seats (3-5 year olds)**

AUTO BOOSTER SEAT

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**Auto booster** seats are designed for children over 20 pounds and are especially suitable for children who have outgrown toddler safety seats. Auto booster seats are firm seats with no sides which must be used with a lap belt and an upper body support, preferably the harness or shield supplied with the auto booster seat. (The harness must be fastened to the car with a tether anchor.) If the car's lap and shoulder belt is used, make sure the shoulder belt does not cut across the child's neck. Without upper body support, the effectiveness of the booster seat is severely reduced.

Auto boosters are more effective than ordinary firm cushions because of the belt guides on each side. These guides enable the lap belt to hold onto the booster so that it will not slip out during a crash. The guides also position the lap belt forward and low over the child's thighs so that it will not ride up on the abdomen. One should never use standard pillows or cushions to boost a child.

**Adult Safety Belts**

Children who have outgrown their safety seats should use the vehicle's **safety belts**. If a toddler has to ride in a car without a safety seat, he or she should use the adult lap belt. The belt should be snug and as low on the child's hips as possible. If the shoulder belt crosses the child's face or neck, it should be placed behind the child's back after the buckle has been fastened. If the child's head can still reach the dash in a sudden stop, then he or she should ride buckled in the back seat. Rear seats generally are safer.

In an **emergency** situation in which there is one more child than there are safety belts, three children of approximately the same size can be best protected with two safety belts in the back seat by having the child in the middle share a belt with both children on the side.

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**Top Anchor Straps for Safety Seats**

Some models of convertible seats, toddler seats, and auto booster seats have a top anchor strap/harness which fastens the top of the restraint to the structure of the car. When included, **the top anchor strap must be used** and pulled tightly to ensure adequate crash protection. A properly anchored tether seat can give an extra margin of protection over lap-belt-only seats in small cars and in side crashes. However, if one doesn't use the top tether, the child is less protected.

**The Best Safety Seat**

All child safety seats manufactured after January 1, 1981, must pass tests which show that they can provide adequate protection for children in actual crashes. One should look on the back of the seat for the restraint's label which states the date of manufacture.

Seats vary in size and convenience factors. One should TRY BEFORE BUYING! Try the child in the seat and the seat in the family car. **Not all seats fit all cars or all safety belt systems.** One should try the seat in both the front and back seats of the vehicle.

The same car seat may sell at a wide range of prices. One should ask about rental, recycling, or wholesale programs being run by hospitals, service groups or health departments.

## VIII. PRINT MATERIALS AVAILABLE FROM NHTSA

**Safety Belts**

| | |
|---|---|
| **How Many of These Fairy Tales Have You Told?**<br>(Discusses the excuses most often given for not using safety belts.) | DOT-HS-802-152<br>color fold out brochure |
| **The Automobile Safety Belt Fact book**<br>(Discusses the effectiveness of safety belts and child safety seat and how the systems work. A good comprehensive coverage of the issues involved.) | DOT-HS-802-157<br>(Revised May 1982)<br>22 pages |
| **Safety Belts: A History Lesson for Adults**<br>(An easy-to-read, witty discussion of safety belts covering effectiveness, how they work, why they should be worn, and the excuses given for not using them.) | DOT-HS-806-175<br>fold out brochure |
| **Safety Belt Fact Sheet**<br>(Contains: facts, myths, information on effectiveness and annotated diagram on how belts work.) | No Number<br>1 page printed on both sides |
| **Safety Belt Activity Book**<br>(A guide to teachers of grades K-6 for instructing their students on the value of safety belts.) | DOT-HS-802-153<br>60 pages, w/large color-in wall poster |
| **Employer Guidelines for Safety Belt Programs**<br>(Discusses the benefits of safety belt use programs. Also contains recommended use policies, employee incentives, educational activities, and public information programs.) | No Number |
| Education Curricula (pre-K, K-3, 4-6, 7+) | No Number |

| | |
|---|---|
| **Child Car Safety Seats** | DOT-HS-805-060 |
| **Early Rider Loan-A-Seat Guide**<br>(Discusses how to establish child car safety seat loan programs.) | 40 pages |
| **Early Rider Educational Curriculum**<br>(Discusses the health professional's role in encouraging the use of child car safety seats and provides some practical guides for such a program.) | DOT-HS-805-060<br>28 pages |
| **Child Safety Seats for Your Automobile**<br>(Discusses why the seats are needed, kinds available, how to use and select them, and where they can be purchased.) | DOT-HS-805-174<br>18 page brochure |
| **Posters** | |
| **Safety Belt Poster/Get It Together** | No Number<br>16 x 20" |
| **Child Safety Seat Poster/Myths & Facts** | DOT-HS-806-046 (a) |
| **Child Safety Seat Poster/Safer Than a Mother's Arms** | DOT-HS-806 (b) |

Individual copies of print materials can be obtained from the National Highway Traffic Safety Administration (NHTSA) by sending a self addressed mailing label. Negatives are available for loan from NHTSA Regional Offices, or State Highway Safety Agencies to organizations wishing to reproduce materials for large safety belt use programs or general distribution. For Regional Office addresses, see the back page.

Small quantities of these and other printed materials may be available from State Highway Safety Agencies or the NHTSA Regional Office. The NHTSA Regional Office serving your State can put you in touch with your own State Highway Safety Agency.

## IX. OVERVIEW OF AUDIOVISUAL MATERIALS DISTRIBUTED BY NHTSA

| Title | Running Time | Description or Appropriate Audience |
|---|---|---|
| **Safety Belts** | | |
| • "Egg"* | 30 sec. | Effectiveness |
| • "Pumpkin"* | 30 sec. | Myths ("thrown clear") |
| • "Headache"* | 30 sec. | Dynamics, Effectiveness |
| • "Dynamics of a Crash" (DOC) | 3 min. | Dynamics |
| • "Safety Belts Save Lives" (SBSL) | 2 min. | Effectiveness |
| • "Safety Belts and You" "(SBAY)* | 8 min. | Dynamics, Effectiveness, Myth |
| • "Are You Convinced?" (AYC) | 5 min. | Dynamics, Effectiveness, Myth |
| • "Safety Belts: Fact and Fiction" (SBFF) | 12 min. | Review (sound/slides) |
| • "Risk" | 2½ min. | Probability of being in a crash |
| • "Do You Buckle-Up?" | 8 min. | Grades 4-9 Myths & Misconceptions |
| • "Otto the Auto-Buckle-Up" | 5 min. | Grades K-4, Effectiveness |
| • "Rediscover the Safety Belt" | 8½ min. | General Appeal for safety belts |
| • "Lucky 13" | 15 min. | Youth audience (7-13) |
| **Child Car Safety Seats** | | |
| • "Children and Infants in Car Crashes" (CICC)* | 5 min. | Dynamics, Effectiveness (slides) |
| • "Child Restraints" (CR) | 3 min. | Review |
| • "Childsafe" (C)* | 10 min. | Review (sound and slides) |

NOTE: Unless otherwise noted, all items are on 16mm film in color, and sound. Some may also be available on 3/4" video tape or 8 mm continuous loop films.

*Very limited availability

## X. AUDIOVISUAL MATERIAL AVAILABLE FROM NHTSA LISTED BY CONCEPTS COVERED

| | | |
|---|---|---|
| **Dynamics** | Safety Belts<br>"Dynamics of a Crash" | Child Passenger Safety<br>"Children and Infants in Car Crashes" |
| **Effectiveness** | "Safety Belts Save Lives"<br>"Egg," "Headache" | |
| **Dynamics, Effectiveness Risk, Myths & Misconceptions** | "Are You Convinced?"<br>"Risk"<br>"Safety Belts and You"<br>"Pumpkin"<br>"Rediscover the Safety Belt" | "Child Restraints" |
| **Review Materials** | "Safety Belts: Fact & Fiction" | "Childsafe" |

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| | |
|---|---|
| **Effectiveness** | Pre-Driving Age Audiences<br>Grades pre-school to 4<br>Grades 2-8<br>Grades 4-9 |
| | "Otto The Auto—Buckle-Up"<br>"Lucky 13"<br>"Do You Buckle-Up?" |

## XI. PRIMARY SOURCES FOR VARIOUS AUDIOVISUAL MATERIALS WHEN UNAVAILABLE FROM YOUR ASSOCIATION

Any inquires can be forwarded to the following address:

Office of Occupant Protection
NHTSA/NTS-10
U.S. Department of Transportation
400 7th Street, S.W.
Washington, D.C. 20590

Inquiries relative to individual audiovisual items can be sent to the following sources if unavailable from NHTSA.

1. **Dynamics of a Crash** (Excerpt from Crashes That Need Not Kill) and
2. **Children and Infants in Car Crashes** (TV version) are available from:
   Insurance Institute for Highway Safety
   600 New Hampshire Avenue, N.W. S300
   Washington, D.C. 20037
   Contact: Ms. Diane Schwartz
   (202) 333-0770
3. **Safety Belts Save Lives**
   Chrysler Corporation
   Automobile Safety Relations
   P.O. Box 1919
   Detroit, MI 48288
   Contact: C.M. Kennedy
   (313) 956-3953

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4. **Are You Convinced?** and
5. **Do You Buckle-Up?**
   FLI Learning Systems, Inc.
   P.O. Box 2233
   Princeton, NJ 08540
   Contact: Grey Jones
   (609) 921-2020 or 466-9000
6. **Safety Belts and You**
   Ford Motor Company
   Room 988
   American Road
   Dearborn, MI 48121
   Contact: John Manikas
   (313) 322-9172
7. **Safety Belts: Fact and Fiction**
   National Audio Visual Center
   General Services Administration
   Order Section
   Washington, D.C. 20409
   Contact: Order Section
   (202) 736-1891
8. **Childsafe**
   National Safety Council
   444 North Michigan Avenue
   Chicago, IL 60611
   Contact: Dr. Christy Hughes
   (312) 527-4800
9. **Otto the Auto**
   AAA Foundation for Traffic Safety
   8111 Gatehouse Road
   Falls Church, VA 22047
   Contact: Order Department
   (703) 222-6891
10. **Lucky 13**
    10-14 available only from:
    Office of Occupant Protection
    NHTSA/NTS -10
    400 7th Street, S.W.
    Washington, D.C. 20590
    (202) 426-9294
11. **Egg, Pumpkin and Headache**
    (formerly used as public service announcements)
12. **Child Restraints**
13. **Risk**
14. **Rediscover the Safety Belt**

**WHERE CURRENT CHILD SAFETY SEAT SHOPPING GUIDES MAY BE OBTAINED**

1. State Highway Safety Office (Call appropriate NHTSA Regional Office — see listing in this guide — for telephone number and address)
2. American Academy of Pediatrics
   Division of Public Education
   1801 Hinman Avenue
   Evanston, IL 60204
3. National Child Passenger Safety Association
   P.O. Box 841
   Ardmore, PA 19003

## XII. NHTSA REGIONAL OFFICES

**REGION I**
(Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
NHTSA Regional Administrator
Transportation System Center
Kendall Square Code 903
Cambridge, MA 02142
(617) 494-2680

**REGION II**
(New Jersey, New York, Puerto Rico and Virgin Islands)
NHTSA Regional Administrator
Room 204
222 Mamaroneck Avenue
White Plains, NY 10605
(914) 683-9690 Ext. 311, 312, 313, 314

**REGION III**
(Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia)
NHTSA Regional Administrator
Airport Plaza Building
793 Elkridge Landing Road
Linthicum, MD 21090
(301) 962-3877

**REGION IV**
(Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee)
NHTSA Regional Administrator
Suite 501
1720 Peachtree Road, N.W.
Atlanta, GA 30309
(301) 881-4537

**REGION V**
(Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin)
NHTSA Regional Administrator
Suite 214, Executive Plaza
1010 Dixie Highway
Chicago Heights, IL 60411
(312) 756-1950

**REGION VI**
(Arkansas, Louisiana, New Mexico, Oklahoma, and Texas)
NHTSA Regional Administrator
819 Taylor Street, Room 11A26
Fort Worth, TX 76102
(817) 334-3653

**REGION VII**
(Iowa, Kansas, Missouri, and Nebraska)
NHTSA Regional Administrator
P.O. Box 19515
Kansas City, MO 64141
(816) 926-7887

**REGION VIII**
(Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming)
NHTSA Regional Administrator
555 Zang Street, 1st Floor
Denver, CO 80228
(303) 234-3253

**REGION IX**
(American Samoa, Arizona, California, Guam, Hawaii, and Nevada)
NHTSA Regional Administrator
Two Embarcadero Center
Suite 610
San Francisco, CA 94111
(415) 556-6415

**REGION X**
(Alaska, Idaho, Oregon, and Washington)
NHTSA Regional Administrator
3140 Federal Building
915 Second Avenue
Seattle, WA 98174
(206) 442-5934

NOTE: Each Regional Office has a safety belt coordinator.

## REFERENCES


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3. Nichols, J.L., **Effectiveness & Efficiency of Safety Belt & Child Restraint Usage Programs**, NHTSA Technical Report No. DOT-HS-806 142, 1982.
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## Acknowledgments


The following people have contributed to the development of this Manual and program

Jan Brown—National Association for Education of Young Children

Joan Cooley—Washington State Early Childhood Education Steering Committee

William Cushman—American Driver & Traffic Safety Education Association

Katie Hicks—Washington Traffic Safety Commission

William Kane, Ph.D.—American College of Preventive Medicine

Judy Karon—Washington State Early Childhood Education Steering Committee

Susan Mond—National PTA

Elaine Weinstein Lawless—National Child Passenger Safety Association

Margaret Montgomery—National Association of Elementary School Principals

B.E. "Buzz" Pruitt, Ph.D.—Association for the Advancement of Health Education

Becky Smith, Ph.D.—Ohio University

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Marilena Amoni
Denise Maddox
James Nichols, Ph.D.
Nancy Rubenson
Michael Smith
Judith Kaplan Wener

## Learning Activity Two:
### What's True? What's Not?

**Objective:**
Students will (1) identify reasons people cite for not wearing safety belts and (2) determine the accuracy of these reasons.

**Audiovisual Support:**
"Are You Convinced?" 5 minutes;
"Risks" 2 minutes.

1. Ask students to complete the first section of the activity sheet, listing the reasons people give for not using safety belts.
2. Write the various reasons on the chalkboard. How many students agree with each reason? Record that number.
3. Pick out the top five or ten reasons given and ask the class to comment on them. Are they excuses for not wearing safety belts?
4. Next introduce some facts about these reasons, either through handouts or the film "Are You Convinced?"
5. Have students complete the activity sheet.
6. Discuss the correct answers, using the information on page 6 of the Occupant Protection Reference Manual as well as the explanations on the learning activity sheet. Encourage an objective assessment of each issue. (Remember, you'll never convince everyone.)
7. Finally, re-examine the list of top reasons to see how many students still agree with them. Are there any changes? For which ones?

**Optional Activities:**
1. Have each student ask five persons outside class why they don't wear safety belts and then explain the facts they've learned. Do the students think this information affected anyone's position regarding the use of safety belts? Which reasons were most affected?
2. Ask students to construct a chart in which they compare myths regarding safety belt use to myths in other areas of health risk ("Drugs are okay for people who can handle them"; "Low-tar cigarettes are safe.") Are there similarities? How could they be dispelled?

## Learning Activity Three:
### How Do Safety Belts Help in a Crash? How Effective Are They?

**Objectives:**
Students will (1) identify at least six ways belts help in a crash, (2) understand the importance of the lap and shoulder belt combination, and (3) understand how belts help in different crash situations.

**Audiovisual Support:**
"Dynamics of a Crash," 2½ minutes; "Safety Belts Save Lives," 2 minutes; "Headache," 30 seconds; "Are You Convinced?" 5 minutes.

1. Point out the fact that lap and shoulder belts are extremely effective when used together. How do your students feel about them? Are students willing to use lap belts but reluctant to use shoulder belts? Is there resistance to any type of safety belt? How many students are aware of the substantial increase in protection that lap and shoulder belts provide over lap belts alone?
2. To demonstrate the difference in protection, show the film "Safety Belts Safe Lives" (or, let students examine an appropriate brochure such as the Safety Belt Fact Book).
3. Discuss what the film (or brochure) demonstrates about the effectiveness of lap versus lap and shoulder belts.
4. Review the illustration at the top of their activity sheet with the class.
5. Next discuss the six ways safety belts help in a crash.
6. Have the students examine the graphs and complete the exercises.
7. Finally, discuss the implications of these findings, as well as the other issues presented.

**Note:**
The effectiveness of safety belts has been well documented. Refer to pages 2-4 in the Occupant Protection Reference Manual for data from studies to include in your classroom discussion.

**Optional Activities:**
1. Take your class to a local auto salvage yard to examine wrecked vehicles. Encourage your students to speculate on the crash forces and on whether the occupants were restrained at the time of the crash. Also, invite an emergency physician, local law enforcement official, or emergency medical technician who is familiar with motor vehicle crashes and injuries to discuss vehicle damage and occupant injuries.
2. Contact your State Highway Safety Office to see if "The Convincer" is available for use with your students. "The Convincer" is a machine which allows individuals to experience the effects of a 10mph sudden stop while safely belted in a seat.
3. Ask students to write a public service announcement for a local radio or television station or newspaper in which they briefly make clear the main ways in which safety belts protect car occupants. Run or print the announcement, either at your school or at a local newspaper or radio or television station.

## Learning Activity Four:
### What About Automatic Protection Devices?

**Objectives:**
Students will (1) identify differences among manual safety belts, automatic safety belts, and air bags and (2) compare and contrast the effectiveness of these systems in preventing traffic deaths.

**Audiovisual Support:**
"Automatic Answer," 5 minutes.

1. Ask your students if they are aware of automatic safety belts and air bags and how they work. (If you have the film "Automatic Answer," show it now.)
2. Have your students complete the section on the activity sheet on automatic safety belts, and discuss their answers with them.
3. Explain that currently few vehicle models have automatic safety belts as an option (some include Chevrolet Chevettes, Volkswagen Rabbits, and Toyota Cressidas). See 5 of the Occupant Protection Reference Manual for further information about automatic crash protection.
4. Next, ask students what they know about air bags, and let them complete that section of the activity sheet. (Some manufacturers such as Mercedes are now offering air bags as optional equipment.)
5. The effectiveness section of the learning activity shows that all of the systems provide valuable protection in most crash situations. Each type has its own advantages and disadvan-


Consult the Occupant Protection Reference Manual for additional background information.

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tages. After your students complete question six, use this information to discuss their answers:

| Advantages | Disadvantages |
|---|---|
| Manual Belts<br>1. Good overall protection<br>2. Relatively inexpensive<br>3. Already in vehicles | 1. People don't wear them<br>2. Less protection than air bags in frontal crash |
| Automatic Belts<br>1. No action required<br>2. Relatively inexpensive<br>3. Good overall protection | 1. Occupants may object to belts wrapping around them<br>2. Less protection than air bags in frontal crash |
| Air bags<br>1. Best protection in frontal crash<br>2. No action required | 1. Less effective for non-frontal crash<br>2. More expensive than safety belts<br>3. Not yet in cars |
| Air bags with lap belts<br>1. Best overall protection in all crashes | 1. More expensive than safety belts |

6. Emphasize the fact that the advantages of any of the above systems far outweigh the disadvantages. Any of these systems would save thousands of lives and prevent hundreds of thousands of serious injuries.
7. Wrap up this section by showing students how much low usage rates reduce the "real-world" effectiveness of safety belts. The "real-world" effectiveness is the effectiveness when used (e.g., 58 percent) multiplied by the percent of people using it (e.g., 20 percent).

   Example: 58 percent (effect when used) x 20 percent (percent using) = 11.6 percent (real world potential)
8. Ask students if they know of any foreign countries which have passed laws requiring safety belt usage. What do students think of such laws? (More than 25 nations have passed such laws and many have achieved usage rates of 70-90 percent. (See the Effectiveness and Efficiency study (Nichols, 1982) for more information on foreign belt use laws).

### Optional Activities:

1. Debate the advantages and disadvantages of different systems, their availability, effectiveness, and usage rates in your school and/or local community.
2. Have students observe safety belt and child passenger safety seat use in your school or community. Later, have students tabulate their results and compare them to national usage rates.

## Learning Activity Five:

### How Do Safety Belt Retractors Work?

### Objective:

Students will understand how the locking mechanism of a safety belt works.

Most newer model cars have safety belts that lock up only when the car accelerates or decelerates rapidly (car-sensitive systems). This is in contrast to older systems that responded to the rapid movement of the belts (belt-sensitive systems). Thus, many people mistakenly believe that because they can pull on belts without their locking up, the belts won't work in a crash. Recent surveys suggest that more than half of all non-users think their belts don't work. (Some people have even tried to have them repaired!)

1. Ask how many members of your class have thought their belts weren't working because they can pull on them without the belts locking up.
2. Let the students work through the activity sheet.
3. Discuss and analyze the illustration thoroughly and answer the questions on the activity sheet. If possible, bring a belt assembly (from an auto salvage yard) to class for the students to examine.
4. Ask your class to describe how to adjust a safety belt correctly. In order for safety belts to do their job, they must be worn with the lap belts fastened low across the pelvis, not high on the abdomen, and with the shoulder belts used only with lap belts worn across the torso, not under the arm, never without.

### Optional Activities:

1. Students may take the activity sheet home and check their parents' knowledge of the various protection devices and the way a retractor works. Using the diagram and information on the activity sheet, students can teach their families.
2. Should anyone decide to demonstrate how safety belts lock up in a sudden deceleration, make sure they (1) pick an empty parking lot; (2) have everyone buckled up in the car, and (3) go no faster than 5 mph before applying the brakes. Passengers in the front seat should feel their shoulder belts lock up.

## Learning Activity Six:

### Who's in Charge Here?

### Objective:

Students will understand that they are responsible for young children and other passengers in a car, as well as for themselves.

### Audiovisual Support:

"Child Restraints," 3 minutes; "Risk," 2 minutes.

1. Show the film "Child Restraints."
2. Ask your class how they feel about the need for child safety seats. What do your students feel about responsibility for young children riding in their car? Do their feelings of responsibility vary for parents, siblings, friends, or strangers? Do your students think they have any authority to request passengers to buckle up when they are driving?

   What if a person knew that: a) at least one out of three friends would be injured seriously in a car crash in their lifetime; b) no one can predict when or where that serious crash will occur; and c) safety belts can prevent more than half of such serious injuries? Knowing these facts, does that person have more of a responsibility to ask others to buckle up?
3. Have students complete the learning activity.
4. For each question tabulate the number of students who agree, disagree, etc.
5. Most importantly, discuss the results of each tabulation in view of what has been included in previous activities.

### Optional Activity:

Role play a variety of situations, such as 1) a driver wants his/her passengers to buckle up, but they are resisting, 2) parents don't wear safety belts and a student/child encourages them to wear belts, 3) a younger brother or sister won't stay in the car seat and an older brother (or sister) insists that he/she does, 4) your student's date or friend who is the driver has had too much to drink at a party. He/she insists on driving, and refuses to wear a belt. What does your student do?



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